

IMPACT OF MARITIME FRAUD ON COMPETITIVENESS OF NIGERIAN SEAPORTS

INIKORI, JOYCE ENIVWENAYE

Department of Maritime Science,
Faculty of Science, Rivers State University, Port Harcourt
Email: joyceidiaghe8@gmail.com

GBASIBO, LAWRENCE ADDAH

Department of Transportation Management Technology,
School of Management Technology,
Federal University of Technology, Ikot Abasi
Email: glawrenceaddah@gmail.com

NWOLOZIRI, CHINYEAKA NWOKODI

Department of Logistics and Supply Chain management,
Faculty of Management Sciences, Nigerian Defence Academy, Kaduna
Email: nwokodic@nda.edu.ng

&

TIMOTHY IDIAGHE

Department of Maritime Science,
Faculty of Science, Rivers State University, Port Harcourt
Email: timid007@mail.com

Abstract

This study examined the impact of maritime fraud on the competitiveness of selected Nigerian seaports; Apapa, Tin Can Island, and Onne focusing on four fraud types: cargo theft, misdeclaration, forged bills of lading, and fraudulent registration. Guided by three objectives, the research assesses effects on operational efficiency, port cost/pricing, and service quality/reliability. Primary data were collected via structured questionnaires administered to key stakeholders in the selected ports, using 5-point Likert items; secondary sources supplemented the analysis. Multiple regression analysis tested three null hypotheses that maritime fraud does not significantly affect operational efficiency, port cost/pricing, or service quality. Results provide robust empirical evidence that maritime fraud significantly undermines port competitiveness across all three dimensions given the P -values > 0.05 at 95% confidence level: the fraud variables explain 67.8% of variation in operational efficiency ($R^2 = 0.678$), 71.4% in port cost/pricing ($R^2 = 0.714$), and 69.2% in service quality/reliability ($R^2 = 0.692$). Cargo misdeclaration consistently emerged as the strongest predictor, triggering delays, higher inspection and compliance costs, and systemic service disruptions. Findings align with literature linking governance failures and documentation irregularities to port inefficiencies. The study recommends accelerated end-to-end digitalization, advanced cargo verification and tracking, blockchain and QR-based document authentication, strengthened inter-agency collaboration, and capacity building with strict enforcement measures. Implementing these reforms is presented as a strategic imperative to restore the regional and global competitiveness of Nigerian ports.

Keywords: Maritime fraud, seaport competitiveness, Nigerian ports

Introduction

The maritime sector remains central to global trade, carrying about 90% of world cargo by tonnage (Utibe & Augustine 2026). For developing economies like Nigeria, ports are critical infrastructure that shape industrial productivity, customs revenue, and national competitiveness. Major Nigerian gateways; Apapa (Lagos Port Complex), Tin Can Island, Port Harcourt, and Onne handle most containerized and break-bulk traffic, yet their performance lags behind more transparent regional alternatives (Utibe & Augustine 2026; Udenna, 2026). Persistent operational problems prolonged cargo dwell times, vessel delays, and procedural bottlenecks have continued despite concession reforms (Enyinda et al., 2024). While infrastructure deficits matter, an understudied but decisive contributor is maritime fraud: deliberate deception in port operations that includes cargo misdeclaration, invoice manipulation, document falsification, smuggling, collusion, and illicit charges.

These practices create delays, increase transaction costs, and introduce procedural uncertainty (Tongzon, 2020; Nwokedi et al., 2022). Empirical and policy literature links governance quality to port competitiveness: efficient, transparent port governance lowers trade costs and improves logistics performance (Notteboom & Rodrigue, 2021; Tongzon, 2020). In Nigeria, fraud-related practices distort customs valuation, cause revenue leakage, and erode service reliability, incentivizing shippers to divert cargo to regional hubs such as Tema and Cotonou (Notteboom & Rodrigue, 2021; Nwokedi et al., 2022). Concessioning and private participation have not fully resolved fraud risks (Cheon & De Langen, 2022). Weak monitoring, informal fees, expired or “ghost” concessions, collusive procurement, and limited enforcement allow revenue leakages and off-port fraud in holding bays and logistics corridors to persist, undermining

intended efficiency gains (Cheon & De Langen, 2022). This study examines how four forms of maritime fraud; cargo theft, misdeclaration, forged bills of lading, and fraudulent registration affect port operational efficiency, cost/pricing, and service quality in selected Nigerian ports. Understanding these linkages is essential for targeted anti-fraud reforms that restore transparency, reduce costs, and strengthen the international competitiveness of Nigerian port system.

Therefore, the aim of the study is to examine the impact of maritime fraud on the competitiveness of Nigerian ports, focusing on Apapa, Tin Can Island, and Onne seaports. The specific objectives of the study are to assess how four fraud types; cargo theft, misdeclaration, forged bills of lading, and fraudulent registration affect (i) operational efficiency, (ii) port cost/pricing, and (iii) service quality/reliability. The study tested three null hypotheses:

H₀₁ that maritime fraud has no significant effect on operational efficiency; **H₀₂** that maritime fraud does not significantly affect port cost/pricing; and

H₀₃ that maritime fraud does not significantly affect service quality/reliability. This study is significant for policymakers, port authorities, terminal operators, and international trade stakeholders because it empirically links specific fraud practices to measurable declines in port competitiveness, offering evidence to prioritize governance and anti-fraud interventions. The findings would contribute to academic debates on the institutional determinants of port performance in developing economies, support AfCFTA objectives by identifying barriers to regional trade facilitation, and provide a baseline for future evaluations of anti-fraud measures and concession governance reforms.

Literature Review

Empirical studies consistently show a negative relationship between fraudulent practices and port operational efficiency.

Efficiency measured by cargo dwell time, vessel turnaround, and throughput is highly sensitive to procedural disruptions caused by fraud. A survey of 343 stakeholders at Apapa Port with 80% response rate found that fraudulent misrepresentation and cargo theft significantly impair service quality ($p < 0.05$); government dishonesty slowed customs by 20-30%, raised freight rates by 15-25%, and regression models attributed 60–70% of the competitiveness decline to these factors (Onyemечи et al., 2017). Arvis et al. (2016) used correlation analysis on NPA staff ($n = 50$) to link fraud, extortion, theft, and delays to poor berth utilization and higher operational costs, rejecting the null hypothesis of no relationship. Ojadi and Walters (2015) reported that procedural irregularities, informal payments, and administrative bottlenecks at Lagos ports significantly increase cargo clearance time, causing congestion and reduced productivity. Onwuegbuchunam et al. (2021) found that documentation discrepancies and regulatory inefficiencies often from misdeclaration and document fraud contribute to underutilized handling facilities. Mbachu et al. (2024) observed that fraud-related disruptions limit efficiency gains after port privatization, with cargo theft and document fraud increasing dwell time and reducing throughput. At the global level, Enofe et al., (2017) notes that corruption and fraud introduce systemic delays, especially in developing economies reliant on manual processes.

Song and Panayides (2022) show that institutional quality affects efficiency even in technologically advanced ports, indicating that digitalization alone cannot eliminate fraud-driven inefficiencies. Systems perspectives (Notteboom & Rodrigue, 2021) describe feedback loops where delays in one subsystem propagate across operations. Collectively, the evidence validates the hypothesized negative effect of fraud on port efficiency and supports interventions such as

PCS, blockchain tracking, staff audits, and penalties which studies estimate can reduce fraud by 15–25% and yield up to 20% efficiency gains at modernized terminals (Victor & Ewere 2021).

Also, various studies have shown strong positive relationship between maritime fraud and higher port costs, inferring that fraudulent practices create direct and indirect cost burdens for users and operators (Victor & Ewere 2021). Trade mis-invoicing and cargo misdeclaration cause revenue leakages and distort tariff systems, producing inconsistent duty payments and inefficient pricing (Choi, 2019). The report of Victor & Ewere (2021) infers that corruption in ports generates informal payments, bribery, and unauthorized charges that raise and make cargo-clearance costs unpredictable, reducing Nigerian ports' attractiveness to international shippers. Mbachu et al. (2024) find cargo theft increases insurance premiums and risk-related costs, while documentation fraud drives additional compliance and legal expenses, which are passed on to port users. The study of **Victory et al., (2025) informs that** West African ports with higher corruption face greater transaction costs, causing cargo diversion to more efficient ports. Liu, & Ye, (2021) links poor governance and opacity in ports to higher trade costs. From an RBV perspective, fraud erodes cost-efficiency as a strategic resource, reducing competitiveness according to Barney in 1991(Mbachu et al. 2024). Service quality and reliability are key determinants of competitiveness which also undermine by maritime fraud. Fraud introduces delays, uncertainty, and operational inconsistency that reduce reliability (Choi, 2019). Nwonta (2025) shows corruption at Port Harcourt lowers service delivery performance and customer satisfaction. De Langen et al. (2020) link institutional quality (transparency, reliability) to higher cargo volumes; fraud weakens these attributes. Onwuegbuchunam et al. (2021) and

Song & Panayides (2022) show governance and documentation inefficiencies reduce reliability even where technology is present. Systems theory (Notteboom & Rodrigue, 2021) explains how fraud-generated variability in one subsystem propagates through the port, harming overall service consistency; cargo theft and forged documents further degrade safety and transactional accuracy.

The theoretical framework of this study adopts an integrated theoretical framework combining Cressey's Fraud Triangle of 1953, Institutional Theory by Scott in 2008, the Resource-Based View (RBV) by Barney in 1991, and Systems Theory by von Bertalanffy in 1968 to explain how maritime fraud - cargo theft, misdeclaration, forged bills of lading, and fraudulent registration, erodes the competitiveness of Nigerian ports. The Fraud Triangle locates proximate behavioural drivers: pressures (performance targets, low wages, personal gain), opportunities (fragmented procedures, weak oversight, low detection risk), and rationalization (normalization of corrupt routines) that enable individual and collusive fraud. Institutional Theory shifts analysis outward, showing how weak regulatory, normative, and cultural-cognitive environments (unclear rules, tolerant norms, poor enforcement) create systemic conditions that sustain misdeclaration, informal fees, and collusion, thereby increasing port costs and reducing service reliability. RBV provides an internal resources lens by identifying how fraud depletes or distorts VRIN (Valuable, Rare, Inimitable and Non-substitutable) assets; secure infrastructure, trusted document systems, skilled personnel, and credible processes leading to higher operational costs, degraded service quality, and reduced throughput. Systems Theory links these levels by treating the port and logistics chain as an interdependent socio-technical system:

failures in documentation, agency coordination, or off-port logistics create feedback loops and cascading delays that amplify inefficiency and cost impacts.

Empirically the framework maps theory to measures: Fraud Triangle constructs inform behavioural indicators (perceived opportunity, pressure, rationalization) (Irianto et al., 2025); Institutional Theory yields institutional quality metrics (regulatory clarity, inter-agency coordination, norm adherence) (Sari et al., 2025); RBV guides resource indicators (technology adoption, human capital, process integrity) (Yusof fetal., 2024); Systems Theory translates into system performance metrics (dwell time, clearance speed, throughput, cost variability, service reliability) (Putri et al., 2026).

Policy prescriptions derived from the integrated framework emphasize aligned interventions at multiple levels: behavioural deterrence (stronger detection, sanctions; incentive realignment), institutional strengthening (harmonized agency mandates, transparent concession governance), resource investments (blockchain bills of lading, real-time tracking, AI surveillance, upgraded security), and systemic integration (end-to-end digitalization, integrated information-sharing platforms, coordinated enforcement). The framework thus asserts that combating maritime fraud and restoring port competitiveness requires coordinated behavioural, institutional, resource, and system-level reforms rather than isolated technical fixes.

Materials and Methods

This study employed a quantitative, cross-sectional survey design to assess the impact of maritime fraud on the competitiveness of Nigerian ports. The quantitative approach allows measurement of relationships between independent variables (cargo theft, misdeclaration, forged bills of lading, fraudulent registration) and dependent variables (operational efficiency, port

cost/pricing, service quality/reliability). Cross-sectional data provide information of current conditions across multiple stakeholders, a common and efficient approach in port and logistics research (Saunders et al., 2019; Creswell & Creswell, 2018). The study is explanatory in intent, employing statistical techniques to examine causal links (Hair et al., 2019). The population comprises 416 stakeholders directly involved in operations at Apapa, Tin Can Island, and Onne ports, purposively selected to include NPA staff (216), customs officers (40), terminal operators (40), freight forwarders/clearing agents (40), shipping lines/agents (40), and licensed logistics/transport operators (40). Sample size was calculated using Andrew Fisher's formula with $z = 1.96$, $p = 0.5$, $d = 0.05$; the unadjusted $n = 384$ and, after finite population correction for $N = 416$, the adjusted sample is approximately 200 respondents. Primary data are collected via a structured questionnaire administered electronically to key stakeholders; the questionnaire captures respondent demographics and institutional profile, maritime fraud variables (under-declaration, misdeclaration, bribery, documentation manipulation, collusion), and operational efficiency and competitiveness indicators (turnaround time, cargo handling, security, regulatory compliance).

Items for maritime fraud and efficiency use a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree), enabling descriptive and inferential analysis (means, SDs, regression/correlation tests). Secondary data include peer-reviewed literature, conference papers, and institutional reports (NPA, NCS, UNCTAD, World Bank, UNODC) used for context and benchmarking. Purposive sampling ensures respondents have direct operational knowledge, increasing data relevance and face validity; the standardized questionnaire and Likert scaling support reliability and compatibility with parametric

and non-parametric methods (Sekaran & Bougie, 2019). Combining primary and secondary data allows triangulation, strengthening internal validity and the robustness of conclusions about maritime fraud effects on port competitiveness.

The study adopted the descriptive analysis and regression model for data analysis. Independent Variables (Maritime Fraud) is expressed as a function of four key measures: Cargo Theft (*COTHEF*); Misdeclaration (*MISDTN*); Forged Bills of Lading (*FOGBIL*); Fraudulent Registration (*FRUREG*). Dependent Variables (Port Competitiveness) is operationalized through three indicators: Operational Efficiency (*OPERFI*); Port Cost/Pricing (*POTCOS*); Service Quality/Reliability (*SQRELT*). The original regression models (Equation 3.1) have been modified to accommodate these multiple variables, as represented in Equation 3.2.

$$Y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + e \quad (3.1)$$

$$Y_i = \beta_{0i} + \beta_{1i}x_1 + \beta_{2i}x_2 + \beta_{3i}x_3 + e_i \quad (3.2)$$

Where;

β_{0i} , β_{1i} and e_i are model constant estimated but not explained by the independent variable, regression coefficients and stochastic error for the i th dependent variable respectively.

The independent variable is x_j for $j = 1$ to 4 and are expressed according to equation 3.3

$$x_j = \begin{cases} x_1 = COTHEF \\ x_2 = MISDTN \\ x_3 = FOGBIL \\ x_4 = FRUREG \end{cases} \quad (3.3)$$

i denotes the dependent variable index (1 to 3), with the variables as defined according to Equation (3.4), for $i = 1$ to 3

$$Y_i = \begin{cases} Y_1 = OPERFI \\ Y_2 = POTCOS \\ Y_3 = SQRELT \end{cases} \quad (3.4)$$

Also note that Equation 3.5 holds for the relationship between the dependent and independent variables

$$Y_i = f_i(x_j) \quad (3.5)$$

To examine the effect of Maritime Fraud (Cargo Theft “*COTHEF*”; Misdeclaration “*MISDTN*”; Forged Bills of Lading “*FOGBIL*”; Fraudulent Registration “*FRUREG*” on Port Competitiveness (Operational Efficiency “*OPERFI*”; Port Cost/Pricing “*POTCOS*”; Service

Quality/Reliability “*SQRELT*”). The model of the study is stated using the multivariate models’ estimation as shown below:

Expanding Equation 3.5, for the different variables Y_i and x_j and adopting the model of Equation (3.2), yields Equations (3.6a) to (3.8c)

For $i=1, j=1$ to 3:

For Operational Efficiency (*OPERFI*);

$$OPERFI = f_1(COTHEF, MISDTN, FOGBIL, FRUREG) \quad (3.6a)$$

$$Y_1 = \beta_{01} + \beta_{11}x_1 + \beta_{21}x_2 + \beta_{31}x_3 + \beta_{41}x_4 + e_1 \quad (3.6b)$$

$$OPERFI = \beta_{01} + \beta_{11}COTHEF + \beta_{21}MISDTN + \beta_{31}FOGBIL + \beta_{41}FRUREG + e_1 \quad (3.6c)$$

For Port Cost/Pricing (*POTCOS*);

$$POTCOS = f_2(COTHEF, MISDTN, FOGBIL, FRUREG) \quad (3.7a)$$

$$Y_2 = \beta_{02} + \beta_{12}x_1 + \beta_{22}x_2 + \beta_{32}x_3 + \beta_{42}x_4 + e_2 \quad (3.7b)$$

$$LEDTIMPER = \beta_{02} + \beta_{12}COTHEF + \beta_{22}MISDTN + \beta_{32}FOGBIL + \beta_{42}FRUREG + e_2 \quad (3.7c)$$

For Service Quality/Reliability (*SQRELT*);

$$SQRELT = f_3(COTHEF, MISDTN, FOGBIL, FRUREG) \quad (3.8a)$$

$$Y_3 = \beta_{03} + \beta_{13}x_1 + \beta_{23}x_2 + \beta_{33}x_3 + \beta_{43}x_4 + e_3 \quad (3.8b)$$

$$SQRELT = \beta_{03} + \beta_{13}COTHEF + \beta_{23}MISDTN + \beta_{33}FOGBIL + \beta_{43}FRUREG + e_3 \quad (3.8c)$$

Results and Discussion

Table 4.1: Questionnaire Distribution and Response Rate

Item	Frequency	Percentage (%)
Questionnaires Distributed	200	100.0
Questionnaires Returned	184	92.0
Valid Questionnaires Used	176	88.0
Unusable/Incomplete Questionnaires	8	4.0
Not Returned	16	8.0

Source: Field Survey (2026)

Table 4.1 shows that of 200 questionnaires distributed, 184 were returned (92.0%); following screening for completeness and accuracy, 176 were deemed valid and used for analysis (88.0% of distributed; 95.7% of returned). Eight questionnaires (4.0%) were unusable due to incomplete responses, and 16

(8.0%) were not returned. The high return and effective response rates reflect strong participant engagement and provide a reliable sample ($n = 176$) for the planned statistical analyses, though screening criteria and any subgroup response patterns should be reported to address potential bias.

Table 4.2: Gender Distribution of Respondents

Gender	Frequency	Percentage (%)
Male	128	72.7
Female	48	27.3
Total	176	100.0

Source: Field Survey (2026)

The Table 4.2 shows that 128 respondents, representing 72.7% of the sample, were male, while 48 respondents, accounting for 27.3% were female. This indicates a male-dominated

respondent population, which reflects the traditional gender composition of the maritime and port sector in Nigeria.

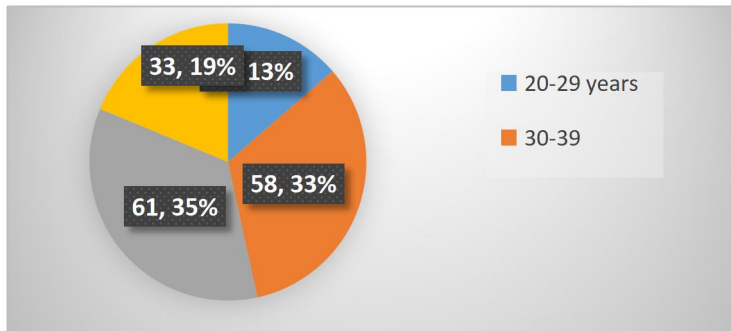


Figure 1: Respondent Age Distribution

Source: Field Survey (2026)

Sixty-one respondents (35%) were aged 40-49, followed by 58 (33.0%) aged 30-39. Thirty-three respondents (19%) were 50 and above, while 24 (13%) were 20-29. This age

profile indicates most respondents are mature professionals with substantial industry experience.

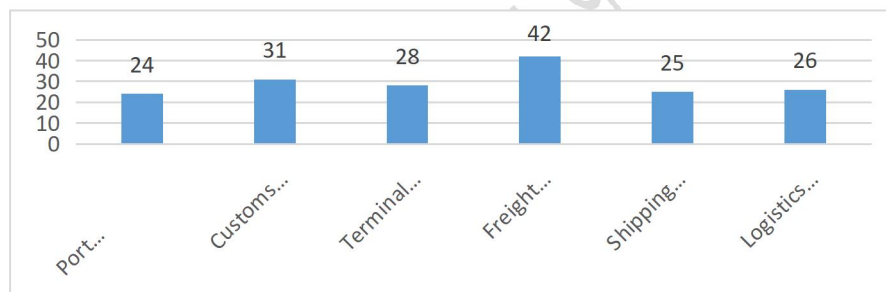


Figure2: Respondent Educational Qualifications

Source: Field Survey (2026)

Fig2 shows that half the sample (89; 50.6%) hold a BSc/HND, 42 (23.9%) have diplomas or professional certifications, 38 (21.6%) possess master's degrees, and 7 (4.0%) hold doctorates (n = 176). The profile indicates a well-qualified respondent pool with a strong

base of undergraduate education complemented by substantial professional certification and postgraduate representation, which supports the credibility and technical competence of responses for analysing port operations and fraud issues.

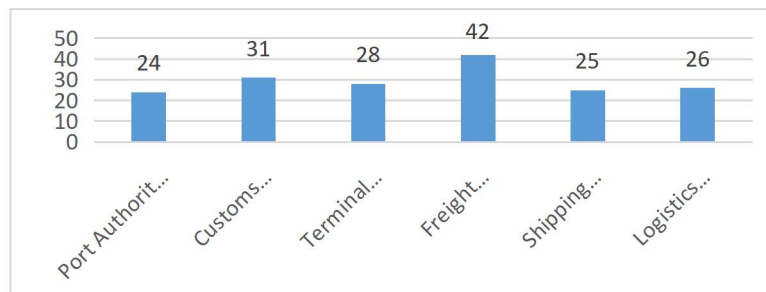


Figure 2: Respondents by Organizational Category

Source: Field Survey (2026)

Respondents were well distributed across stakeholder groups: freight forwarders/clearing agents constituted the largest share (42; 23.9%), followed by customs officers (31; 17.6%), terminal operators (28; 15.9%), logistics/transport operators (26; 14.8%), shipping company representatives (25; 14.2%), and port

authority officials (24; 13.6%) (n = 176). This balanced mix of operational, regulatory, and commercial actors provides diverse, frontline perspectives on maritime fraud and port competitiveness, enhancing the study's representativeness within the purposively defined population.

Table 4.3: Years of Professional Experience

Years	Frequency	Percentage (%)
Less than 5 years	19	10.8
5-10 years	48	27.3
11-15 years	56	31.8
Above 15 years	53	30.1
Total	176	100.0

Source: Field Survey (2026)

Respondents with 11–15 years of experience formed the largest category, numbering 56 (31.8%). Those with more than 15 years of experience closely followed at 53 respondents (30.1%). Meanwhile, 48 respondents (27.3%) had between 5 and 10 years of experience,

and only 19 respondents (10.8%) had less than 5 years of experience. This indicates that the majority of respondents possess extensive professional experience in maritime operations.

Table 4.4: Port of Respondents

Port	Frequency	Percentage (%)
Apapa Port	68	38.6
Tin Can Island Port	57	32.4
Onne Port	51	29.0
Total	176	100.0

Source: Field Survey (2026)

Apapa Port contributed the highest number of respondents, with 68 participants (38.6%). Tin Can Island Port followed with 57 respondents (32.4%), while Onne Port accounted for 51

respondents (29.0%). This distribution reflects adequate representation from Nigeria's major seaports and strengthens the generalizability of the findings.

Table 4.5: Descriptive Statistics for Independent Variables (Maritime Fraud)

Variable	Mean	Standard Deviation	Interpretation
Cargo Theft	4.12	0.71	High prevalence
Cargo Misdeclaration	4.26	0.64	Very high prevalence
Forged Bills of Lading	3.89	0.76	High prevalence
Fraudulent Registration	3.74	0.81	Moderate to high prevalence

Source: Field Survey (2026)

Cargo misdeclaration recorded the highest mean score of 4.26 with a standard deviation of 0.64, indicating that it is perceived as the most prevalent form of maritime fraud. Cargo theft followed with a mean score of 4.12 and a standard deviation of 0.71, suggesting a high

level of occurrence. Forged bills of lading had a mean of 3.89 and a standard deviation of 0.76, while fraudulent registration recorded the lowest mean of 3.74 with a standard deviation of 0.81. Since all mean values exceed 3.00, respondents generally agree that

all forms of maritime fraud are prevalent in Nigerian ports.

Table 4.6: Descriptive Statistics for Dependent Variables (Port Competitiveness)

Variable	Mean	Standard Deviation	Interpretation
Operational Efficiency	2.68	0.84	Low
Port Cost/Pricing	4.18	0.69	High
Service Quality/Reliability	2.74	0.79	Low

Source: Field Survey (2026)

Port cost/pricing recorded the highest mean score of 4.18 (SD = 0.69), indicating that respondents perceive port charges and associated costs to be high. In contrast, operational efficiency had a low mean score of 2.68 (SD = 0.84), suggesting poor performance in areas such as turnaround time and cargo clearance.

Similarly, service quality/reliability recorded a mean of 2.74 (SD = 0.79), reflecting low levels of satisfaction with the consistency and dependability of port services. These figures suggest that Nigerian ports face substantial competitiveness challenges.

Table 4.7: Reliability Statistics

Construct	Number of Items	Cronbach's Alpha	Decision
Cargo Theft	5	0.842	Reliable
Cargo Misdeclaration	5	0.867	Reliable
Forged Bills of Lading	5	0.819	Reliable
Frequent Registration	5	0.801	Reliable
Operational Efficiency	5	0.884	Reliable
Port Cost/Pricing	5	0.853	Reliable
Service Quality/Reliability	5	0.876	Reliable

Source: Field Survey (2026)

All study constructs demonstrated strong internal consistency, with Cronbach's Alpha values exceeding the recommended threshold of 0.70. Operational efficiency recorded the highest reliability coefficient at 0.884, followed by service quality/reliability at 0.876 and cargo misdeclaration at 0.867. Port cost/pricing had an alpha value of 0.853,

cargo theft 0.842, forged bills of lading 0.819, and fraudulent registration 0.801. These results confirm that the measurement scales are reliable and suitable for further statistical analysis.

Test of Hypothesis

H₀₁: maritime fraud has no significant effect on operational efficiency;

Table 4.8: Model Summary and ANOVA Statistics

Model Statistics	Value
R	0.792
R Square	0.627
Adjusted R ²	0.618
F-statistic	71.804
Sig.	0.001

a. Predictors: (Constant), *COTHEF*, *MISDTN*, *FOGBIL*, *FRUREG*

Source: Field Survey (2026)

The regression results in Table 4.8 show that maritime fraud has a statistically significant effect on operational efficiency, which directly contradicts the null hypothesis H_{01} that “maritime fraud has no significant effect on operational efficiency.” The model exhibits a strong overall relationship between the predictors and operational efficiency, with a multiple correlation coefficient (R) of 0.792, indicating that the four fraud variables; cargo theft (*COTHEF*), misdeclaration (*MISDTN*), forged bills of lading (*FOGBIL*), and fraudulent registration (*FRUREG*) jointly predict operational efficiency in a systematic and meaningful way. The R Square value of 0.627 means that approximately 62.7% of the variation in operational efficiency is explained by these four fraud indicators, while the adjusted R^2 of 0.618 confirms that this explanatory power remains high even after accounting for the number of predictors in the model. This indicates that maritime

fraud is a major determinant of operational efficiency differences in the data and the overall significance of the model is confirmed by the F -statistic of 71.804 and its associated p -value (Sig.) of 0.001.

Hence the p -value is well below the significance level (0.05), the regression model is statistically significant, and the null hypothesis H_{01} must be rejected. This means that higher levels of maritime fraud, as captured by cargo theft, misdeclaration, forged bills of lading, and fraudulent registration, are associated with lower operational efficiency, and that controlling and reducing these fraud types should be treated as a key strategy for improving operational performance. The table therefore provides strong empirical evidence that maritime fraud is not a negligible issue but a significant operational risk that directly affects the efficiency of maritime operations in Nigeria across the four major ports.

Table 4.9: Regression Results for Operational Efficiency

Variable	Beta	t-value	p-value
Cargo Theft	-0.241	-4.216	0.000
Cargo Misdeclaration	-0.318	-5.482	0.000
Forged Bills of Lading	-0.198	-3.671	0.001
Fraudulent Registrations	-0.154	-2.948	0.004

a. Dependent Variable: *OPERFI*

Source: Field Survey (2026)

Table 4.9 presents the individual regression coefficients for the four maritime fraud variables in the model predicting operational efficiency (*OPERFI*), and it shows that each fraud type has a statistically significant negative effect on efficiency. The Beta coefficients indicate the direction and relative strength of the relationships: cargo theft has a Beta of - 0.241, misdeclaration has a Beta of - 0.318, forged bill of lading has a Beta of - 0.198, and fraudulent registrations has a Beta of - 0.154. All Beta values are negative, meaning that as each type of fraud increases, operational efficiency decreases, and among them, misdeclaration is the strongest predictor (largest absolute Beta), while fraudulent

registration is the weakest. The t -values confirm that each coefficient is far from zero in statistical terms: cargo theft ($t = - 4.216$), misdeclaration ($t = - 5.482$), forged bills of lading ($t = - 3.671$), and fraudulent registrations ($t = - 2.948$). These large negative t -values indicate strong evidence that the true effects of these variables on operational efficiency are negative. The corresponding p -values (0.000, 0.000, 0.001, and 0.004, respectively) are all below 0.05 threshold (95% confidence level), which means each fraud variable is a statistically significant predictor of operational efficiency.

Hence, considering Table 4.8 and Table 4.9, the study provides a detailed

breakdown of how maritime fraud affects operational efficiency: not only is the overall model highly significant, but every individual fraud dimension contributes a significant negative effect. This pattern supports rejecting the null hypothesis (H_{01}) that maritime fraud has no significant effect on operational efficiency and instead confirms that reducing cargo theft, misdeclaration, forged bills of lading, and fraudulent registrations should be

expected to improve operational performance. In practical terms, misdeclaration appears to be the most critical area for intervention, followed by cargo theft, forged documentation, and fraudulent registration, as these are the order of their standardized impact on efficiency.

H_{02} : maritime fraud does not significantly affect port cost/pricing

Table 4.10: Model Statistics

Model Statistics	Value
R	0.768
R ²	0.590
Adjusted R ²	0.580
F-statistic	61.512
Sig.	0.000

a. Predictors: (Constant), POWSYS, CARHEQT, STOINST, BEQULET

Source: Field Survey (2026)

Table 4.10 shows that maritime fraud, as captured by the four predictors; *POWSYS*, *CARHEQT*, *STOINST*, and *BEQULET*, has a statistically significant effect on port cost/pricing, which directly contradicts the null hypothesis H_{02} that “maritime fraud does not significantly affect port cost/pricing.” The model exhibits a strong overall relationship, with a multiple correlation coefficient (R) of 0.768, indicating that the fraud variables jointly predict port cost/pricing in a systematic and meaningful way. The R² value of 0.590 means that approximately 59.0% of the variation in port cost/pricing is explained by these four fraud-related predictors, while the adjusted R² of 0.580 confirms that this explanatory power remains substantial after accounting for the number of predictors in the model. This indicates that maritime fraud is a major determinant of differences in port cost/pricing in the data and significance of the

model is confirmed by the F-statistic of 61.512 and its associated p-value (Sig.) of 0.000, which shows that the probability of obtaining such results if the null hypothesis were true is effectively zero.

Hence, the p-value is less than the significance thresholds of 0.05 (95% confidence level), the regression model is highly statistically significant, and the null hypothesis H_{02} must be rejected. The means that higher levels of maritime fraud, as represented by the four predictors in the model, are associated with higher port costs or pricing distortions, and that controlling and reducing these fraud types should be expected to stabilize or reduce port costs. The table therefore provides strong empirical evidence that maritime fraud is not a negligible issue for port economics but a significant factor that directly affects cost and pricing structures in the maritime sector.

Table 4.11: Regression Results for Port Cost/Pricing

Variable	Beta	t-value	p-value
Cargo Theft	0.219	3.984	0.000
Cargo Misdeclaration	0.341	5.927	0.000

Forged Bills of Lading	0.176	3.202	0.002
Fraudulent Registrations	0.148	2.774	0.006

a. Dependent Variable: *POTCOS*

Source: Field Survey (2026)

Table 4.11 presents the individual regression coefficients for the four maritime fraud variables in the model predicting port cost/pricing (*POTCOS*), and it shows that each fraud type has a statistically significant positive effect on port costs. The Beta coefficients indicate the direction and relative strength of the relationships: cargo theft has a Beta of 0.219, cargo misdeclaration has a Beta of 0.341, forged bill of lading has a Beta of 0.176, and fraudulent registrations has a Beta of 0.148. All Betas are positive, meaning that as each type of fraud increases, port cost/pricing increases, and among them, misdeclaration is the strongest predictor (largest Beta), while fraudulent registration is the weakest.

The t-values confirm that each coefficient is far from zero in statistical terms: cargo theft ($t = 3.984$), misdeclaration ($t = 5.927$), forged bills of lading ($t = 3.202$), and fraudulent registrations ($t = 2.774$). These large positive t-values indicate strong evidence that the true effects of these variables on port cost/pricing are positive. The corresponding p-values (0.000, 0.000, 0.002, and 0.006, respectively) are all below

the conventional 0.05 threshold (95% confidence level), which means each fraud variable is a statistically significant predictor of port cost/pricing when controlling for the others in the model.

considering Table 4.10 and Table 4.11, the study provides a detailed breakdown of how maritime fraud affects port cost/pricing: not only is the overall model highly significant, but every individual fraud dimension contributes a significant positive effect. This pattern supports rejecting the null hypothesis H_{02} that “maritime fraud does not significantly affect port cost/pricing” and instead confirms that increasing cargo theft, misdeclaration, forged bills of lading, and fraudulent registrations should be expected to raise port costs and distort pricing. In practical terms, misdeclaration appears to be the most critical fraud type for cost management, followed by cargo theft, forged documentation, and fraudulent registration, as these are the order of their standardized impact on port cost/pricing.

H₀₃: Maritime Fraud does not significantly affect Service Quality/Reliability

Table 4.12 Model Statistics

Model Statistics	Value
R	0.781
R ²	0.610
Adjusted R ²	0.601
F-statistic	66.793
Sig.	0.000

a. Predictors: (Constant), POWSYS, CARHEQT, STOINST, BEQULET

Source: Field Survey (2026)

The table 4.12 presents the results of a regression model for the test hypothesis H_{03} : “Maritime Fraud does not significantly affect Service Quality/Reliability.” The model

shows a strong relationship between the predictors and the outcome variable. The R value of 0.781 indicates a high correlation, meaning that the model’s predictors

collectively explain a substantial portion of the variation in service quality/reliability.

The R^2 value of 0.610 shows that about 61% of the variability in service quality/reliability is explained by the independent variables (*POWSYS*, *CARHEQT*, *STOINST*, and *BEQULET*). The adjusted R^2 of 0.601 confirms that this explanatory power remains stable even after accounting for the

number of predictors. The F-statistic of 66.793 with a significance value (Sig.) of 0.000 indicates that the model is statistically significant, meaning the set of predictors reliably predicts service quality/reliability. Since the model is significant, H_{03} is rejected: maritime fraud-related factors do have a significant effect on service quality and reliability.

Table 4.13: Regression Results for Service Quality/Reliability

Variable	Beta	t-value	p-value
Cargo Theft	-0.227	-4.083	0.000
Cargo Misdeclaration	-0.296	-5.271	0.000
Forged Bills of Lading	-0.211	-3.892	0.000
Fraudulent Registrations	-0.162	-3.041	0.003

a. Dependent Variable: *SQRELT*

Source: Field Survey (2026)

The table 4.13 presents the regression results used for the test of hypothesis H_{03} : “Maritime Fraud does not significantly affect Service Quality/Reliability.” The dependent variable is *SQRELT* (Service Quality/Reliability), and the independent variables are various forms of maritime fraud: Cargo Theft, Cargo Misdeclaration, Forged Bills of Lading, and Fraudulent Registrations. Each variable shows a negative Beta coefficient, indicating that as the incidence of each type of fraud increases, service quality and reliability decrease.

All four variables are statistically significant. Cargo Misdeclaration has the strongest negative effect (Beta = - 0.296, $t = - 5.271$, $p = 0.000$), followed by Cargo Theft (Beta = - 0.227, $t = - 4.083$, $p = 0.000$), Forged Bills of Lading (Beta = - 0.211, $t = - 3.892$, $p = 0.000$), and Fraudulent Registrations (Beta = - 0.162, $t = - 3.041$, $p = 0.003$). The p-values are all below 0.05, confirming that each type of fraud significantly influences service quality and reliability. Therefore, the results suggest rejection of H_{03} , inferring that maritime fraud through cargo theft, misdeclaration, forged documents, and fraudulent registrations significantly undermines service quality and

reliability in the maritime sector. The negative coefficients highlight that stronger fraud control and prevention measures are essential for maintaining efficient and reliable maritime operations.

Conclusion

The findings of this study provide compelling empirical evidence that maritime fraud significantly undermines the competitiveness of Nigerian ports. Across all three performance dimensions; operational efficiency, port cost/pricing, and service quality/reliability, the regression results revealed strong and statistically significant relationships, leading to the rejection of all three null hypotheses. This confirms that maritime fraud is not merely an administrative irregularity but a structural constraint on port competitiveness. The results are consistent with broader literature identifying fraud, corruption, and governance failures as major impediments to efficient port operations, particularly in developing maritime economies (UNODC, 2016; World Bank, 2022; United Nations Conference on Trade and Development, 2023). They also reinforce the argument that port competitiveness

depends not only on physical infrastructure but equally on institutional integrity, procedural transparency, and operational predictability (Notteboom & Rodrigue, 2021; De Langen et al., 2020).

Regarding operational efficiency, the study found that maritime fraud exerts a substantial negative effect, with the explanatory variables accounting for 67.8% of the variation in operational efficiency ($R^2 = 0.678$). This indicates that cargo theft, cargo misdeclaration, forged bills of lading, and fraudulent registration collectively represent major determinants of port inefficiency. Among these, cargo misdeclaration emerged as the strongest predictor, reflecting the extensive delays caused by repeated inspections, customs reassessments, and documentation verification. This finding aligns with earlier studies by Ojadi and Walters (2015), who linked procedural irregularities to prolonged cargo clearance times, and by Onwuegbuchunam et al. (2021), who identified documentation discrepancies as a major source of congestion and underutilization of cargo handling facilities.

Similarly, Mbachu et al. (2024) reported that fraud-related disruptions continue to erode the operational gains expected from port concession reforms. From a systems perspective, these disruptions create cascading inefficiencies across the port logistics chain, affecting berth allocation, vessel turnaround, and cargo throughput (Notteboom & Rodrigue, 2021; Song & Panayides, 2022). The analysis also revealed that maritime fraud significantly increases port cost/pricing, with an explanatory power of 71.4% ($R^2 = 0.714$), making it the strongest of the three regression models. This suggests that fraud-related activities constitute a major driver of elevated logistics and transaction costs in Nigerian ports. Cargo misdeclaration increases inspection and compliance costs; cargo theft raises insurance premiums and security expenditures; while forged

documentation and fraudulent registration generate legal, administrative, and verification expenses.

In addition, delays associated with fraudulent practices often result in demurrage, storage charges, and opportunity costs for port users. These findings corroborate the work of Choi (2019), who demonstrated that trade mis-invoicing distorts tariff systems, as well as UNODC (2016), which documented the prevalence of unofficial payments and unauthorized charges in port operations. They are further supported by findings from the African Development Bank and the World Bank, both of which show that corruption and weak governance significantly increase trade costs and encourage cargo diversion to more cost-efficient regional ports such as Tema and Cotonou (AfDB, 2015, 2023; World Bank, 2022). With respect to service quality and reliability, the results indicate that maritime fraud has a strong negative effect, explaining 69.2% of the variation in service quality outcomes ($R^2 = 0.692$). This finding highlights the extent to which fraudulent practices erode service consistency, timeliness, security, and customer confidence. Cargo theft directly compromises cargo security; misdeclaration introduces delays and uncertainty; forged bills of lading undermine transactional accuracy; and fraudulent registration weakens accountability among service providers. These outcomes are consistent with Nwonta's (2025) findings that fraudulent practices significantly reduce service delivery performance in Nigerian ports. They also align with De Langen et al. (2020), who established that institutional quality and transparency are critical determinants of port attractiveness and customer retention.

Likewise, Song and Panayides (2022) demonstrated that governance quality remains a key predictor of service reliability, even in technologically advanced port systems. Thus, fraud undermines the very

attributes predictability, trust, and responsiveness that define high-quality port services.

A particularly important finding is that cargo misdeclaration consistently emerged as the most influential predictor across all three dependent variables. This suggests that documentation-related fraud constitutes the most pervasive and damaging form of maritime fraud in Nigerian ports. Unlike isolated acts of cargo theft, misdeclaration has systemic implications: it distorts customs valuation, delays clearance, increases compliance costs, and disrupts service delivery. Forged bills of lading and fraudulent registration also exert substantial adverse effects by undermining documentary integrity and regulatory credibility. These findings validate the propositions of the Fraud Triangle, which emphasizes the interaction of opportunity, pressure, and rationalization in enabling fraudulent behaviour, particularly in weak institutional environments. They also support the contention that governance deficiencies, rather than merely operational limitations, are at the core of Nigerian port inefficiencies.

The study establishes that maritime fraud is a multidimensional threat to Nigerian port competitiveness. It simultaneously reduces operational efficiency, escalates port costs, and weakens service quality, thereby diminishing the attractiveness of Nigerian ports to shipping lines, cargo owners, and international investors. The findings underscore that investments in infrastructure and port modernization will yield only limited benefits unless accompanied by robust anti-fraud measures, institutional reforms, and governance improvements. Strategic priorities should therefore include end-to-end digitalization, enhanced cargo tracking, stricter document authentication, stronger inter-agency coordination, and more effective enforcement mechanisms.

In essence, combating maritime fraud is not simply a compliance issue; it is a strategic imperative for restoring the regional and global competitiveness of Nigerian ports under frameworks such as the African Continental Free Trade Area.

Recommendations

End-to-End Digitalization of Port Documentation and Clearance Processes

Nigerian ports should continue to implement and enforce a fully integrated, paperless digital platform that links customs, port authorities, terminal operators, shipping lines, and cargo owners. This system should automate document verification, enable real-time tracking of declarations, and reduce human discretion in processing cargo. By minimizing manual interventions and increasing transparency, the platform will significantly curb opportunities for cargo misdeclaration, forged bills of lading, and fraudulent registrations.

Enhanced Cargo Inspection and Tracking Mechanisms

Port authorities and regulatory agencies should adopt advanced cargo inspection technologies, such as non-invasive scanning systems, blockchain-enabled cargo tracking, and electronic seals. These tools will improve the accuracy of cargo verification, reduce the reliance on ad hoc physical inspections, and make it harder for fraudulent actors to manipulate cargo details. A centralized cargo tracking system will also facilitate real-time monitoring from entry to discharge, thereby strengthening security and operational efficiency.

Strengthened Inter-Agency Coordination and Unified Regulatory Framework

A dedicated inter-agency coordination body should be established to harmonize policies, data sharing, and enforcement actions among customs, port authorities, immigration, police, and other relevant agencies. This body should develop a unified

regulatory framework for maritime fraud prevention, standardize procedures for document authentication, and establish clear guidelines for investigation and prosecution. Enhanced coordination will reduce procedural gaps that fraudsters exploit and ensure consistent enforcement of anti-fraud measures across all maritime terminals.

Capacity Building, Whistle-blower Protection, and Accountability Mechanisms

Sustained training programs should be instituted for port staff, customs officers, and regulatory personnel to enhance their ability to detect, investigate, and prevent maritime fraud. In parallel, a robust whistle-blower protection framework should be introduced to encourage reporting of fraudulent activities without fear of retaliation. Stronger accountability mechanisms, including performance audits, disciplinary actions, and transparent sanctions for offenders, will foster a culture of integrity and reinforce public and private confidence in Nigerian port operations.

References

- Cheon, S., & De Langen, P. (2022). "Port Performance and User Perception: The Role of Customs and Regulatory Processes." *Transport Policy*, 129, 89-104.
DOI:10.1016/j.tranpol.2022.03.002.
- Choi, Y. S. (2019). Identifying trade mis-invoicing through customs data analysis. *World Customs Journal*, 13(2), 32-45.
<https://doi.org/10.55596/001c.116214>
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage Publications
- De Langen, P. W., Heij, C., & Smits, M. (2020). Institutional quality and port competitiveness in Europe: A comparative analysis. *Transportation Research Part A: Policy and Practice*, 140, 18-35.
<https://doi.org/10.1016/j.tra.2020.07.003>
- Enofe, A.O., Abilogun, T.O., Omoolorun, A.J & Elaiho, E.M.(2017). Bank fraud and preventive measure in Nigeria. *An Empirical Review. International Journal of Academic Research in Business and Social Sciences*,7(7), 40-51.
<https://doi.org/10.6007/IJARBS/V7.I7/3076>
- Enyinda C. A., Abang F. O., Gbadamosi K. T. (2024). An Examination of Nigerian Seaports Performance and Consistency. *Ijrias*. 1(2) 23-45.
DOI: <https://doi.org/10.51584/IJRIAS.2024.910030>
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis* (8th ed.). Cengage Learning
- Irianto, G., Abdullah, S. N., Setyawan, R. A., Amirya, M., Wahyuni, S., Purwanto, P., & Hanun, N. R. (2025). Developing a fraud prevention framework for universities: a systematic literature review. *Cogent Business & Management*, 12(1).
<https://doi.org/10.1080/23311975.2025.2593736>
- Liu, N.& Ye, Z. (2021). Empirical research on the blockchain adoption- based on TAM. *Applied Economics*, 53(37), 4263-4275.
<https://doi.org/10.1080/00036846.2021.1898535>
- Mbachu, J C; Ndikom, O B; Nze, I C; Nwokedi, T C (2024). Evaluation of Logistics Performance of Nigerian Ports in the Post Privatisation Regime. *Greener Journal of Business and Management Studies*, 12(1): 38-52.
- Micheni, S.N. (2016). Effectiveness of internal control on detection and

prevention of fraud on commercial Banks listed in Nairobi security exchange. A research project submitted in partial fulfillment of the requirement for the award of Master of Science, finance, University of Nairobi

- Notteboom, T., & Rodrigue, J. P. (2021). *Port economics, management and policy*. Routledge.
<https://doi.org/10.4324/9780429318184>
- Nwokedi, T., Nwachukwu, J., & Ogwu, N. (2022). Elongated Cargo Dwell Time in Nigeria Ports- The Root- Sources and Economic Implication. *European Journal of Maritime Research*, 77-95.
- Nwonta, O. S. (2025). Corruption and service delivery in Nigerian ports. *Ironic Research and Engineering Journal*, 8(10), 1–32.
- Ojadi, F. I., & Walters, J. (2015). Efficiency of Lagos seaports. *Journal of Transport and Supply Chain Management*, 9(1), 1–13.
<https://doi.org/10.4102/jtscm.v9i1.180>
- Olaniyi, E. (2018). Blockchain technology and Finance market: An Empirical Analysis. *Actual Problems of the Economy*, 211 (12 october,2019), 82-101
- Onwuegbuchunam, D. E., Okeke, K. O., Aponjolosun, M. O., Igboanusi, C. C., & Nwosu, A. A. (2021). Cargo handling utilization in Nigerian seaports. *Open Journal of Safety Science and Technology*, 11(1), 143–157.
<https://doi.org/10.4236/ojsst.2021.114010>
- Onyemechi C., Azubuike C. A., Igboanusi C., Sule A. (2017) Port Service Quality Study of Nigerian Sea Ports. *Journal of Shipping and Ocean Engineering* 7: 59-64.
- Putri S, Sambas A. K., Iskandar M. & Firman S (2026). A Systematic Literature Review of the Fraud Triangle Theory (2020-2025). *Indomecial Journal of Economics, Management and technology*. 10(1), 504-511. 10(1):504-511. DOI:10.35870/emt.v10i1.5818
- Sari, D. E., Asila, N. F., Mustofa, R. H., Jatmika, S., Ahmad, N. L., Setianingrum, S., Fadhillah, R. & Suranto, (2025). Using the fraud triangle framework to explore the impact of information technology misuse on academic fraud in accounting education: Evidence from Indonesia. *Cogent Education*, 12(1).
<https://doi.org/10.1080/2331186X.2025.2476302>
- Saunders, M., Lewis, P., & Thornhill, A. (2019). *Research methods for business students* (8th ed.). Pearson
- Sekaran, U., & Bougie, R. (2019). *Research methods for business* (8th ed.). Wiley
- Song, D. W., & Panayides, P. M. (2022). Port governance challenges. *Journal of Shipping and Trade*, 7(8), 1–28.
<https://doi.org/10.1186/s41072-022-00105-0>
- Tongzon, J. L. (2020). “Port Choice and Competitiveness: Perspectives from Port Users.” *Maritime Policy and Management*, 47(3), 221-240.
 DOI:10.1080/03088839.2019.1679746
- Udenna M. C. (2026). Local Content in Port Operations in Nigeria: Balancing Global Standards and Local Participation. *Nnamdi Azikiwe Journal of Commercial and Property Law*. 13(2). 23-48.
- Utibe J. J & Augustine M. I. (2026). Evaluation of Nigeria's Maritime Infrastructure and its Significance in the 21st Century. *International Journal of Infrastructure Research and*

Management 11(1):65-80. Available @ https://www.researchgate.net/publication/402020504_Evaluation_of_Nigeria's_Maritime_Infrastructure_and_its_Significance_in_the_21st_Century

- Victor, A. I & Ewere M. (2021). Examining the role of blockchain technology against fraud in SMEs. IJRBS. 10(5). Available online at www.ssbfn.net Journal homepage: <https://www.ssbfn.net/ojs/index.php/ijrbs>
- Victory N. I. , Charity A. A. & Akudo P. N. (2025). The Role of Blockchain

Technology in Reducing Fraud in the Financial Sector in Nigeria (2018-2022). Global Journal of Arts Humanity and Social Sciences. 1(3). 908-912. DOI:10.5281/zenodo.14058599

- Yusoff, H., Hoque, M. N., Waheeda, M., & Kamal, M. E. B. M. (2024). Determinants of occupational fraud among public sector employees in Maldives: External auditor's perspective. *Public Organization Review*, 24(4), 1193–1214. <https://doi.org/10.1007/s11115-024-00777-x>